

**SECOND FIVE-YEAR REVIEW REPORT
ROCKAWAY TOWNSHIP WELLS SUPERFUND SITE
ROCKAWAY TOWNSHIP, MORRIS COUNTY, NEW JERSEY**



September 2015

Prepared by

**U.S. Environmental Protection Agency
Region 2
New York, New York**

Approved by:

A handwritten signature in black ink, appearing to read "Walter E. Mugdan", is written over a horizontal dashed line.

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Date:

A handwritten date "Sept. 28, 2015" in black ink is written over a horizontal dashed line.

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Executive Summary

This is the second five-year review (FYR) for the Rockaway Township Wells Superfund Site ("Site") located in Rockaway Township, Morris County, New Jersey. The purpose of this FYR is to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this policy review was the completion of the first FYR in September 2010. Construction completion for the Site, the triggering action for the initial FYR, was achieved with the signing of a Preliminary Close-Out Report on September 21, 2005.

The remedies selected for the site included extraction and treatment of contaminated groundwater, replacement of a deteriorated air stripping unit on the Rockaway Township Municipal Wells potable water treatment plant, soil vapor extraction (SVE) of volatile organic compounds at the Denville Technical Park (DTP), and monitoring to ensure the effectiveness of the remedies. For purposes of implementing the remedies, the site was divided into two operable units (OUs). OU1 included the groundwater extraction and treatment remedy and OU2 included the SVE remedy.

Based upon a review of the 1993 and 2002 Records of Decision, operation and maintenance reports, monitoring reports, and an inspection of the Site, the soil remedy (OU2) protects human health and the environment in the short-term. The site is paved and covered with buildings, so there is no exposure to contaminants in soil unless intrusive activities were to occur. The SVE system continues to operate and remove contaminants from the soil. In order to be protective in the long term, an institutional control preventing disturbance of soils on site needs to be implemented.

Based on this review, a protectiveness statement for groundwater remedy (OU1) cannot be made at this time. EPA plans to contact the Potentially Responsible Party to request an evaluation of the vapor intrusion pathway at the site. At this point, there are not sufficient data to determine if this pathway is an issue. In addition, operational issues with extraction wells for the groundwater remediation system need to be addressed, groundwater samples need to be analyzed for hexavalent chromium and 1,4-dioxane, and the downgradient extent of the plume needs to be better defined. When these issues have been resolved, a protectiveness determination may be made in a FYR addendum.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Rockaway Township Wells Superfund Site		
EPA ID: NJD980654214		
Region: 2	State: NJ	City/County: Rockaway Township, Morris County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: EPA [If "Other Federal Agency", enter Agency name]: Click here to enter text.		
Author name (Federal or State Project Manager): Ronald Naman & Lawrence Granite - Federal		
Author affiliation: USEPA Region 2		
Review period: 9/1/2010 - 9/17/2015		
Date of site inspection: 9/22/2014		
Type of review: Policy		
Review number: 2		
Triggering action date: 9/30/2010		
Due date (five years after triggering action date): 9/30/2015		

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review: N/A

Issues and Recommendations Identified in the Five-Year Review:

OU(s): -OU1	Issue Category: Monitoring			
	Issue: No prior testing for hexavalent chromium or 1,4-dioxane			
	Recommendation: Groundwater samples should be analyzed for hexavalent chromium and 1,4-dioxane from both the Site and the municipal supply wells to ensure they are not present in groundwater or drinking water.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	3/31/2016
OU(s): -OUI	Issue Category: Monitoring			
	Issue: Downgradient plume extent is not delineated			
	Recommendation: A well cluster should be installed with one well within ten feet below the water table and a second at about a 50-foot depth in a location between Extraction Well No. 1 and 701 Ford Road (the parcel across/north of Ford Road opposite of Building 2).			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	3/31/2016
OU(s): -OUI	Issue Category: Operations and Maintenance			
	Issue: Performance of Extraction Well No. 1			
	Recommendation: Extraction Well No. 1 should be rehabilitated so that it can perform at its operation flow rate of five gallons per minute.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	3/31/2016
OU(s): OUI	Issue Category: Operations and Maintenance			
	Issue: Indoor Air Monitoring/Downgradient area indoor air monitoring			
	Recommendation: Sub-slab depressurization system operations and performance for Buildings 1 and 2 have been documented through the presentation of vacuum pressure readings. Indoor air samples should be collected and analyzed for Buildings 1 and 2 to confirm system performance. Additional efforts to identify indoor sources should also occur. Indoor air data at structures overlying the downgradient plume area have not been collected/analyzed. Indoor air samples should be collected at 701 Ford Road and Buildings 3, 5 and 6.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date

Yes	Yes	PRP	State	3/31/2016
OU(s): OU2	Issue Category: Institutional Controls			
	Issue: Surface soil exposure was not evaluated in the risk assessment.			
	Recommendation: A deed notice may be needed to ensure long-term protectiveness.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	3/31/2016

Protectiveness Statement(s)		
<i>Operable Unit:</i> Operable Unit 1	<i>Protectiveness Determination:</i> Protectiveness Deferred	<i>Addendum Due Date (if applicable):</i> 3/31/2017
<p>Protectiveness Statement: A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway, groundwater is sampled for hexavalent chromium and 1,4-dioxane, the downgradient plume is delineated, and the effectiveness of EW-1 is evaluated.</p>		
<i>Operable Unit:</i> Operable Unit 2	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter a date.
<p>Protectiveness Statement: The OU2 remedy protects human health and the environment in the short term because the SVE continues to remove contaminant mass from the source area and the Site is covered with buildings and pavement. In order for the remedy to be protective in the long-term, a deed notice needs to be established for soils.</p>		

Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Protectiveness Deferred	<i>Addendum Due Date (if applicable):</i> 3/31/2017
<p>Protectiveness Statement: A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway, groundwater is sampled for hexavalent chromium and 1,4-dioxane, the downgradient plume is delineated, and the effectiveness of EW-1 is evaluated.</p>	

Introduction

The purpose of this Five Year Review (FYR) is to evaluate the implementation and performance of the remedy to determine if the remedy is and will continue to be protective of human health and the environment, and is functioning as intended by the decision documents. The methods, findings and conclusions of our review are documented in this FYR. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them. This is the second FYR for the Rockaway Township Wells (RTW) Site.

RTW is located in Rockaway and Denville Townships, Morris County, New Jersey. Figure 1 (Source: 2014 Remedial Action Progress Report Denville Technical Park prepared by Leggette, Brashears & Graham for Alliant Techsystems, Inc., January 2015) provides a site plan with general location information. This FYR was conducted by the United States Environmental Protection Agency (EPA) Remedial Project Managers (Ronald Naman and Lawrence Granite) with support from EPA colleagues, pursuant to Section 121 (c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. §9601 *et seq.* and 40 CFR 300.430(f)(4)(ii), and in accordance with the *Comprehensive Five-Year Review Guidance*, OSWER Directive 9355.7-03B-P (June 2001). This report will become part of the Site file.

The triggering action for this policy review was the completion of the first FYR in September 2010. Construction of the soil and groundwater remedies for the Site were completed in 2005. A five-year review is required at this site due to the fact that the remedial action will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete.

Remedial action at RTW included work on two Operable Units (OUs). OU-1 addresses the groundwater contamination and OU-2 addressed soils which adversely impacted the groundwater. This FYR addresses both OUs.

Site Chronology

See Table 1 for the site chronology.

Background

Physical Characteristics

The Site is located in both Rockaway and Denville Townships in Morris County, New Jersey. Rockaway and Denville Townships are situated in the center of Morris County, approximately 10 miles north of Morristown and 20 miles northwest of Newark in the north/central portion of the state.

The Site, as defined by the areal extent of the contaminated groundwater plume, lies in the center of a Y-shaped valley in an otherwise hilly area of the New Jersey Highlands on approximately 183 acres located immediately north of Interstate 80 (Figure 1). The general area is predominantly non-residential industrial-zoned land which includes the Denville Technical Park (DTP) (an industrial building complex). Area development includes commercial businesses, light industries including service stations, restaurants, hotels, plastic manufacturers, truck/transit companies, and commercial office complexes. The 2010 census population for Rockaway Township was recorded as 24,156. The source area of Site-related contamination is predominantly located in Denville Township, while the impacted downgradient water supply wells are located in Rockaway Township. The site overlies, and the municipal wells draw water from, the Buried Valley Aquifer Complex (Upper Rockaway subsection) which is considered a sole source aquifer system. Beaver Brook (the closest surface water body) lies to the east and northeast of the site.

Site Geology/Hydrogeology

The Site sits atop the Buried Valley Aquifer Complex in the Rockaway River Basin. Both a shallow (not uniformly present over the entire Site) and deep aquifer are present at the Site. The area is within the mapped boundary of the Upper Rockaway Sole Source Aquifer designation. The semi-confined aquifers (water-bearing strata) consist of Pleistocene-aged sediments comprised of sand, clay, gravel and cobbles. The municipal wells impacted by the contamination draw water from high-yielding (approximately 500 gallons per minute) municipal supply/production wells which are located approximately 1,000 feet north-northwest of the initial release/spill source zone (near Buildings 1 and 2 in the DTP). The municipal wells are screened in sand and gravel deposits approximately 130 to 160 feet below the ground surface. The capture zone (area of influence) of the municipal wells extends horizontally and vertically to the source area in the DTP.

Land and Resource Use

The general area has been developed into a light industrial and commercial business zone, and includes service stations, restaurants, hotels, plastic manufacturers, truck/transit companies, and commercial office complexes. The DTP is located within the Site along the Denville/Rockaway Township border. No significant changes in land use have occurred since the first FYR, and it is unlikely that this development scenario will change significantly in the future.

A Classification Exception Area/Well Restriction Area (CEA/WRA) (Site CEA ID# NJD980654214/Case ID# G000004876) was issued for the Site by the NJDEP on November 17, 2000. Figure 2 provides a site base map with the groundwater area of impact (approximate areal boundary of the CEA/WRA) delineation. The CEA/WRA was established to provide notice that the constituent (groundwater) standards for the aquifer are not or will not be met in the localized groundwater plume area, and that the designated aquifer use (Class II-A/waters designated for potable drinking water use) are suspended in the affected area for the term of the CEA/WRA. The RTW CEA/WRA is listed (NJDEP Open Public Records Database) as active and includes mapped well restriction boundaries equivalent to the locally contaminated area of the Buried Valley/Upper Rockaway Sole Source Aquifer. The initial term of the CEA/WRA is listed as ten

years. A vertical extent description of the well restriction area is provided in the CEA/WRA database as the depth of the impacted municipal well field or 125 feet. This institutional control mechanism will ensure that there is no unacceptable future use of the contaminated groundwater in the vicinity of the Site until groundwater quality standards are achieved.

Ground and Surface Water Uses

Groundwater is drawn from the Buried Valley Aquifer Complex/Upper Rockaway Sole Source Aquifer as a drinking water source for approximately 14,000 residents in Rockaway Township. The groundwater will continue to be the source of drinking water for the foreseeable future. The surface waters of the White Meadow Brook and the Beaver Brook (nearby surface water bodies) flow into the Rockaway River and are not used for drinking water. Wetlands associated with these brooks exist in the vicinity of the Site.

History of Contamination

Water samples collected by Rockaway Township and the NJDEP from the Rockaway Township Wells in late 1979 and early 1980 indicated the presence of trichloroethene (TCE) and other volatile organic compounds (VOCs). The Township installed an activated carbon adsorption treatment system in response to this contamination. In October 1980, the treated water developed an unpleasant taste and odor. Analysis showed it to be contaminated with the gasoline additives, di-isopropyl ether (DIPE) and methyl tertiary-butyl ether (MTBE).

Following the discovery of contamination in the wellfield, NJDEP performed an area-wide industrial survey to identify potential sources of the groundwater contamination. The survey, along with additional information, revealed that petroleum hydrocarbon products were present in groundwater at a Shell Gas Station and the Town and Country Gas Station, which are both located on Green Pond Road to the west of the wellfield. Chlorinated VOCs were present in groundwater at the DTP.

Initial Response Actions

This project is State-lead. Initial response actions by the State and EPA are briefly discussed below.

State of New Jersey

On October 10, 1980, Rockaway Township declared a water emergency and advised residents to avoid consumption of the water until an air stripping treatment unit was installed on the municipal wells (prior to distribution to consumers). The air stripping unit was installed in February 1982.

In June 1986, pursuant to the New Jersey Spill Compensation and Control Act (Spill Act), N.J.S.A. 58:10-23.11 et. seq., NJDEP issued Directives to Morton Thiokol Incorporated (Thiokol) (then owner of the DTP property), Shell Oil Company (Shell), and the Town and Country Gas

Station requiring payment to NJDEP to conduct a remedial investigation/feasibility study (RI/FS), and payment to Rockaway Township for the operation and maintenance of the air stripping unit. In May 1987, pursuant to the Spill Act, NJDEP entered into an Administrative Consent Order (ACO) with Thiokol and Shell in which the two companies agreed to make the above payments. An RI Report was finalized in November 1988. The Town and Country Gas Station never complied with the Directive.

Based on the information from the 1988 RI Report, NJDEP determined that additional studies were necessary and began a Phase II RI. In April 1989, NJDEP issued Directive II to the Town and Country Gas Station requiring payment to NJDEP to conduct the Phase II RI/FS. The Town and Country Gas Station never complied with Directive II. In September 1989, NJDEP issued Directive III to Thiokol, Morton International Incorporated and Shell requiring payment to NJDEP to conduct the Phase II RI/FS, and payment to Rockaway Township for the continued operation and maintenance of the air stripping unit. The Phase II RI Report was finalized in September 1992. The FS Report was finalized in December 1992.

From April 1988 through April 1995, Thiokol and Shell split the operation and maintenance costs of the Township's air stripping unit. In 1995, NJDEP notified Shell that it had satisfied its obligation since gasoline-related contaminants were no longer being detected in the Rockaway Township Wells. Alliant Techsystems (ATK) (a successor to Thiokol) continues to pay the operation and maintenance costs of the Township's air stripping unit.

In 1999, Thiokol was renamed Cordant Technologies, Inc. (Cordant). In 2000, Alcoa Corporation acquired Cordant and assumed responsibility for remedial work at the Site. In April 2001, ATK purchased the Thiokol portion of Cordant's assets from Alcoa, and assumed responsibility for the environmental liabilities at the Site. ATK, in accordance with the ACO requirements, continues to implement the groundwater and soil remedial actions at the Site.

Federal Actions

In 1982 NJDEP requested that EPA consider this Site for inclusion on the National Priorities List (NPL) of Superfund sites because the public water supply was impacted and the source of the contamination to the wellfield was unknown. EPA placed the Site on the NPL on September 1, 1983.

Basis for Taking Action

The RI/FS documents, which addressed the groundwater contamination, were completed in June 1993. A focused RI was subsequently completed to address the contaminated soils. These documents defined the site geology and hydrogeology, the nature and extent of groundwater contamination, potential migration routes and identified the potential sources of the contamination. Risks associated with each pathway were also documented.

The contaminants of concern (COCs) presented in the baseline human health risk assessment for groundwater (OU1) were VOCs including TCE, 1,1,1-trichloroethane (TCA), vinyl chloride,

methylene chloride and arsenic. The OU2 COCs identified for both soil and soil gas include TCE, tetrachloroethene (PCE), TCA, and cis-1,2-dichloroethene (cis-1,2-DCE).

Potential impacted resources/targets included potable water supply users on the township public supply, as well as employees working in buildings overlying the plume where the vapor intrusion pathway was completed.

The baseline risk assessment stated that the domestic use of untreated groundwater was considered unlikely under both current and future land use scenarios because the groundwater is treated at the wellfield prior to distribution to the public. The evaluation of hypothetical use of untreated groundwater yielded risks above acceptable limits. However, as noted, these risks are being addressed by the remedial action selected for OU1. The baseline risk assessment also indicated that adverse impacts to ecological receptors were unlikely. A risk assessment was conducted for OU2 and found that the subsurface soils did not present an adverse impact to human or ecological receptors. The COC concentrations were above New Jersey Impact to Groundwater screening levels and, as a result, soil remediation was warranted.

Remedial Actions

Remedy Selection

Groundwater Remedy

EPA signed an OUI ROD on October 5, 1993. Its remedial action objectives (RAOs) are as follows: prevent potential human exposure to contaminants in the deep aquifer groundwater which pose a carcinogenic risk to human health in excess of 10⁻⁴ to 10⁻⁶ and/or which have a Hazard Index greater than 1; prevent potential human exposure to contaminants in the shallow aquifer groundwater which pose a carcinogenic risk to human health in excess of 10⁻⁴ to 10⁻⁶ and/or which have a Hazard Index greater than 1; and restoration of water quality of the shallow and deep aquifers to appropriate Federal and New Jersey water quality standards.

The major components of the OU-1 groundwater remedy include:

- Extraction of contaminated groundwater and restoration of the aquifer to the more stringent of the federal and New Jersey MCLs and New Jersey Ground Water Quality Standards;
- Treatment of the extracted groundwater to levels attaining the more stringent of the federal and New Jersey MCLs and New Jersey Ground Water Quality Standards;
- Reinjection of the treated groundwater to the extent needed to promote groundwater restoration, with discharge of any surplus to the public water supply; (n.b., this was subsequently changed in the OU2 ROD to surface water discharge)
- Replacement of the deteriorated air stripping treatment system at the Rockaway Township Wellfield; and,
- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

To describe the occurrence and distribution of chemicals present the site was divided into three major groundwater areas. The three areas of concern are defined by potential sources and by the types of contaminants found in groundwater underlying these areas. Dividing the site in this manner also allowed for an evaluation of the contaminant impact from suspected source areas.

Three distinct groundwater contaminant plumes are associated with the discrete source areas at the site. The areas of concern are as follows: the eastern plume (associated with the Former Degreaser Area in DTP Building 2); the middle plume (associated with the Former Waste Oil UST Area between DTP Buildings 1 and 2); and the western plume (associated with Building 1). Figure 3 - TCE Concentrations in Groundwater (2014) provides a graphic of the contaminant distribution from the three discrete TCE source areas.

The primary contaminant of concern in the eastern and western plume areas is TCE. The middle plume contains both 1,1,1-TCA and TCE with lesser concentrations of their respective decay products.

Soil Remedy

The October 8, 2002 OU-2 ROD addressed contaminated soil adversely impacting the groundwater. The remedial action objectives established for the soils at the Rockaway Township Wells Site, OU-2, are: to provide protection for the Rockaway Township Wells, and to remediate the contaminant source areas in the soil at the Denville Technical Park to meet the Impact to Groundwater New Jersey Soil Cleanup Criteria. The major components of the OU-2 remedy included the following:

- SVE of VOCs in both the Former Degreaser Pit Area and the Former UST Area;
- Treatment, if required, for the extracted vapors prior to release to the atmosphere; and,
- Operation of the SVE system for approximately 3 to 5 years to attain the New Jersey Impact to Groundwater Soil Cleanup Criteria.

In addition, the 1993 ROD was modified to allow the treated groundwater to be discharged to the surface water (Beaver Brook) instead of being re-injected or reused as a potable source.

For soil/source areas, seven areas of concern were initially evaluated which were then reduced to two major areas of contamination which required soil remediation. The two areas included the Former UST adjacent to Building 2 and a Former Degreaser Area in Building 2.

Remedy Implementation

At the request of NJDEP, a combined Groundwater and Soil Remedial Action work plan was prepared by ATK in 2004 which outlined the pre-design activities and design work required to implement the groundwater and soil remedial actions at DTP. The work plan was approved by NJDEP on September 8, 2004.

On September 21, 2004, ATK awarded a contract to Conestoga Rovers & Associates (CRA) for the design and construction of the groundwater and SVE remediation systems. The designs were completed in 1999. CRA sub-contracted the construction activities to More-Trench Inc. who began construction of both remedies on September 22, 2004. Construction was completed on June 5, 2005. Operation of the groundwater extraction system began on June 6, 2005 and the operation of the SVE system began on June 7, 2005. Operation and monitoring of both systems is being performed by Leggette, Brashears and Graham, Inc., for ATK.

Groundwater Remedy

Groundwater Extraction and Treatment System

The groundwater remedial action at the site was initiated in June 2005. The groundwater remedy consists of three groundwater extraction wells (EWs), identified as EW-1, EW-2, and EW-3, and three dual-phase (DP) extraction wells, identified as DP-1, DP-2, and DP-3. The wells were constructed in geographic locations to allow groundwater remediation of the most contaminated portion of the plume, thereby reducing the contamination migrating to the Rockaway Township Wellfield and aiding in the restoration of groundwater to the existing quality standards. Two EW-designated wells are located along Ford Road just north of Buildings 1 and 2 and the third well is located between the buildings. Figure 4 shows the EW locations and their geographic relationship to the Rockaway Township Municipal/Production or Pumping Wells (PWs). The DP wells are located between Buildings 1 and 2. Figure 5 shows the location of the DP wells. Extracted groundwater is treated through use of an air stripper to remove VOCs prior to discharge to surface water. Discharge is regulated in accordance with a New Jersey Pollution Discharge Elimination System (NJPDES) permit. The air from the groundwater treatment system (air stripper) is discharged to the atmosphere in accordance with an NJDEP air permit.

Township Municipal Wells

Rockaway Township PWs are located approximately 1,200 feet north of the DTP. Wells PW-6 and PW-7 (the wellfield) draw VOC-impacted water from the DTP area towards the municipal wells. Public supply water extracted from the wellfield is treated using an air stripper. Treated water meets MCLs and NJ groundwater quality standards.

Soil Remedy

The SVE remediation system was installed in June 2005. The SVE system consists of 10 extraction wells used in conjunction with the three DP wells. Nine of the SVE wells are located between Buildings 1 and 2 in the vicinity of the former UST area. The remaining SVE well is located beneath Building 2 in the vicinity of the Former Degreaser Area. Figure 5 shows the location of the SVE wells. Extracted vapors are routed to vapor-phase carbon for treatment prior to discharge in accordance with air permits issued through the State of New Jersey. Air samples collected from the carbon treatment system effluent show that air permit discharge requirements for the system are being met.

Since start-up, a number of SVE wells have been closed to optimize withdrawal from the remaining wells. In 2014 eight SVE points remained active. These wells continue to withdraw VOCs. Maximum total VOC concentrations in 2014 included recorded values of 1.9 parts per million by volume (ppmv) at SVE-5 and 5.6 ppmv at SVE-9. The estimate provided in the 2014 progress report indicates that approximately 56 pounds of VOCs were extracted from the soil during the 2014 operating period. Since the initial SVE system start-up in June 2005, approximately 1,382 pounds of VOCs have been removed. Some system downtime has occurred due to power outages and computer system malfunctions.

System Operations/Operation and Maintenance

Long-term groundwater and soil vapor monitoring is performed by Leggette, Brashears and Graham, Inc., for ATK to track the performance of the remedial systems, delineate the extent of the plumes, and to evaluate compliance with the remediation goals. The monitoring network consists of 16 monitoring wells which are sampled for VOCs, and 23 monitoring wells measured for groundwater elevations. In addition, three extraction wells are sampled for VOCs and monitored for groundwater elevations.

The effectiveness of the SVE system is monitored by collecting influent air samples from each SVE well and dual-phase well for laboratory analysis for VOCs. Sample collection is currently performed on a semi-annual basis to monitor the effectiveness of the SVE and Groundwater Treatment System. The SVE system has removed more than 1,382 pounds of VOCs from the subsurface since the system began operation in 2005. While the time to reach soil remediation goals was estimated to initially be in the three- to five-year range, it appears based on data through 2014, that the system will need to be operated for at least another five years or longer. Air permit requirements are being met for operation of the SVE vapor-phase carbon treatment systems.

The groundwater and soil vapor monitoring network is evaluated as operation of the extraction system continues. If data indicates that revisions to the groundwater monitoring network are necessary, a revised groundwater monitoring program will need to be submitted to NJDEP by the responsible party.

In conjunction with the groundwater and soil remedies being implemented for the site, ATK was directed by NJDEP to perform vapor intrusion (VI) assessments of Buildings 1 and 2 within the DTP. The VI assessment identified exceedances of the NJDEP and EPA screening levels for both indoor air and soil vapors at a number of locations within the technical park. The results were reported in the 120-Day ESRA Report. Pursuant to the NJDEP Technical Requirements for Site Remediation (NJAC 7:26E-1.14) an Immediate Environmental Concern (IEC) condition was identified in Buildings 1 and 2. Upon further investigation and determination that the heating and ventilation system adjustments could not rectify the indoor air condition, it was determined that a sub-slab depressurization system (SDS) would be installed.

The SDS became operational in Building 2 in July 2010 and the Building 1 system went on-line in November 2010. Following installation of the SDS Mitigation Systems, indoor air and soil

vapor sampling indicated areas requiring additional monitoring in Building 2. The details for this work were outlined in the 270-Day IEC Source Control Report which was submitted to NJDEP in January 2011. During 2011 quarterly rounds of indoor air and soil vapor sampling indicated the systems were functioning properly. A change to annual sampling events was enacted to evaluate system performance.

The results of quarterly rounds of indoor air/soil gas vapor sampling performed in 2011 indicated that a background source was contributing to the elevated VOC concentrations in Building 2. As such, it was recommended that the areas of concern in Building 2 be designated as “no action” areas, and no further sampling was performed. In addition, the frequency for inspections for the SDS Mitigation System was changed from quarterly in 2011 to annual in 2012. Operation, maintenance and monitoring activities for these systems is ongoing.

Climate Change Considerations

Potential impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

Progress Since Last Five-Year Review

Protectiveness Statements and Recommendations – First FYR

The first FYR noted the following protectiveness determinations:

- *Operable Unit 1 (groundwater): A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway. Information will be obtained by analyzing indoor air data from Buildings 1 and 2, and completing vapor intrusion studies for buildings overlying the groundwater contamination plume.*
- *Operable Unit 2 (soil): Since the Site is covered with buildings and pavement, it is considered protective of human health and the environment in the short-term. In order for the remedy to be protective in the long-term, the actions identified in Section VIII need to be taken.*

The recommendations and follow up actions noted in Section VIII include the following:

- *Groundwater samples should be collected for hexavalent chromium and 1,4-dioxane from the Site, as well as the public supply well, to ensure the compound is not present in the groundwater or drinking water.*
- *A well cluster should be installed with one well being within ten feet below the water table and a second at about a 50-foot depth in a location between EW-1 and 701 Ford Road. This well cluster would be important for evaluating the downgradient performance of the groundwater extraction system.*

- *Confirmation sampling should be performed after the installation of the sub-slab depressurization system in Building 1 to evaluate the effectiveness of the measure at reducing concentrations of VOCs in indoor air concentrations.*
- *EPA recommends that a source investigation be performed in Buildings 1 and 2 at Denville Technical Park. Additionally, EPA recommends that the vapor intrusion investigation be expanded to Buildings 3, 5 and 6, and 701 Ford Road, to determine if vapor intrusion pathway is potentially completed there.*
- *An institutional control (e.g., a deed notice) should be placed on the Site to indicate the potential presence of contaminants and the need for precautionary measures should intrusive activities need to be performed.*

Progress on Recommendations

For OU-1, some progress has been made. Vapor intrusion studies have been conducted and remedial actions implemented for Buildings 1 and 2. Expanded investigations on Buildings 3, 5, 6, and at 701 Ford Road, have not been conducted. For the last few years, the evaluation of systems operating in Buildings 1 and 2 have been based on air flow and vacuum pressure readings. No indoor air analytical sampling has been conducted to evaluate the effectiveness of the measure at reducing concentrations of VOCs in indoor air concentrations. This FYR will recommend expanded investigations for vapor intrusion. In addition, this FYR will also recommend, as in the previous FYR, collecting indoor air samples to evaluate background at Buildings 1 and 2.

Groundwater sampling has not been conducted for hexavalent chromium and 1,4-dioxane from the Site or the public supply well, to ensure the compound is not present in the groundwater or drinking water. 1,1,1-TCA, a solvent commonly used with 1,4-dioxane, is still present in groundwater above MCLs. In addition, although metals are not being monitored for in groundwater samples, historical data indicated that a chromium plating facility on the DTP property may have disposed of chromium-contaminated water on site. As a result, this FYR will recommend that groundwater samples be analyzed for these contaminants.

In the area of institutional controls, no formal deed notice is known to have been placed on the properties. Therefore, this FYR will recommend that a deed notice be implemented to prevent disturbance of subsurface soils.

In regard to contaminant plume extent and monitoring, while annual reports submitted for the project indicate declining to stable levels of site-related contaminants of concern, the monitoring point areal coverage in some areas was noted as deficient in past comments. To this end, a well cluster was recommended to fill in the gap in the area of the 701 Ford Road property. A review of monitoring data from the last five years affirms that there are insufficient monitoring wells downgradient to confirm the extent of the groundwater plume. That recommendation is reiterated in this FYR.

Five-Year Review Process

Administrative Components

EPA's FYR team included Ronald Naman and Lawrence Granite, Remedial Project Managers (RPMs); Chloe Metz, Risk Assessor; Katherine Mishkin, Hydrogeologist; and Michael Clemetson, Ecologist. This is a PRP/State-lead site.

Community Involvement

Lawrence Granite called the Municipal Clerk on July 17, 2015 to inform the Township about the planned five-year review. No concerns regarding the site were identified. In addition, EPA Region 2 published a fact sheet, <http://www.epa.gov/region02/superfund/npl/0200775c.pdf>, on August 4, 2015 which stated that a five-year review of the effectiveness of the remedy is being performed by EPA. When this five-year review is completed, copies will be sent to the Municipal Clerk, the local site repository identified in the fact sheet, and EPA's Superfund Records Center located at 290 Broadway, New York, New York.

Document Review

The documents, data and information which were reviewed in completing this FYR are summarized in Table 3.

Data Review

This second FYR focuses on analyzing groundwater and soil vapor data collected since the last (first) FYR.

Groundwater Monitoring Results

Groundwater monitoring occurs on an annual basis and has been performed consistently since 2005. The current monitoring well network consists of 16 monitoring wells sampled for target compound list (TCL) VOCs and 23 monitoring wells measured for groundwater elevations measured to the nearest 0.01 ft. Additionally, the three extraction wells are sampled for TCL VOCs and monitored for groundwater elevations. Prior to the construction of the municipal wells in the mid- to late 1960s, the predominant direction of groundwater flow in the aquifer was thought to be to the south-southwest direction. However, water levels measured in monitoring wells throughout the area indicate that the influences from the Wellfield dominate local groundwater flow. The direction of groundwater flow, as measured in the monitoring well network prior to the start-up of the Groundwater Treatment System, is in the north-northwest direction. Thus, groundwater in the vicinity of the Site flows toward the Wellfield and is thought to be recharged by natural precipitation falling on the area, groundwater drainage along the valley walls, groundwater flowing from areas upgradient of the Site, and infiltration from surface streams. Since the start-up of the Groundwater Treatment System, groundwater flow has been locally influenced by the extraction wells. During 2014, EW-1, EW-2, and EW-3 were maintained at average pumping rates of 3.8 gpm, 14.7 gpm, and 61.9 gpm, respectively. The groundwater flow direction is still generally to the north toward the Wellfield, but some localized effects from pumping are evident, particularly at extraction well EW-3 where there is a

noticeable cone of depression.

Monitoring wells are classified as shallow and deep where shallow groundwater is generally classified between depths of 13 to 58 feet below ground surface and deep groundwater is 44 to 198 feet below ground surface, most likely depending on the location across the Site. The wells are screened in glacial sediments composed of a variability of clays, silts, sands, cobbles, and gravels and, for this reason, there is a range of hydraulic conductivities across the Site.

This FYR covers groundwater sampling data from September 2009 through September 2014. Groundwater sampling results collected during this review period indicate an overall decreasing trend for site-related COCs, with TCE being the primary one. Concentrations of TCE have for the most part been consistently above the New Jersey Groundwater Quality Standard (NJGWQS) of 1 ug/L. The maximum concentration of TCE detected at the Site in 2014 was 200 ug/L in EW-1 while the maximum concentration of TCE detected during this review period was 8,080 ug/L in 2011 (MW-03) (Figures 7 and 8). Other site-related COCs are PCE, 1,1,1-TCA, and 1,1-DCE. A summary of the results is provided in Table 4 and discussed below.

There are three plumes of groundwater contamination that emanate from three different areas of the Site – the eastern (Former Degreaser Pit Area), central (Former Waste Oil UST Area), and western plumes (see Figure 3 for the location of plumes, extraction wells, and monitoring wells).

Eastern Plume

EW-1 is located on the north side of Building 2, downgradient of the Former Degreaser Area. The former degreaser pit was located inside Building 2, near vapor well VW-3. EW-1 was designed specifically to provide source-area capture and treatment of groundwater impacted from the Former Degreaser Pit Area. PCE and TCE are the primary COCs at EW-1 with concentration ranges during this review period of 2.7 ug/L to 6.1 ug/L and 184 to 763 ug/L (Table 4), respectively.

Monitoring well MW-14D is located downgradient of the Former Degreaser Area and immediately adjacent to EW-1. TCE groundwater concentrations at MW-14D have decreased over time from 10,600 ug/L in 2001 to less than 5 ug/L since 2013. The most recent (2014 sampling/progress report submitted January 2015) TCE concentration in MW-14D was 1.6 ug/L (Table 4). Recently, the core of the plume appears to have shifted from MW-3D which has shown TCE concentrations as high as 8,080 during this review period to extraction well EW-1. Concentrations in MW-3D decreased to 8 ug/L in 2014 while EW-1 shows a concentration range of 184 ug/L to 763 ug/L. The lateral limits of the eastern TCE plume are evaluated by monitoring well samples taken from MW-9D and MW-12D, but currently, there is no downgradient monitoring of the eastern plume. During this review period, TCE concentrations in MW-9D have decreased from 3.5 to 1.7 ug/L while concentrations in MW-12D have decreased from 29.7 ug/L to below the NJGWQS. Historically, during the time of the RI (1992) MW-12D did not reveal the presence of TCE, indicating that the plume may be migrating beyond the current monitoring well network.

It should be noted that overall extraction rates of EW-1 have reduced with time and there is some indication that EW-1 has become less effective with time. Little apparent drawdown was evident in monitoring wells situated in close proximity to EW-1, even in MW-14, which is located about ten feet away. However, while EW-1 has been extracting less than 10% of the volume extracted by EW-3, a comparison of the mass of VOCs extracted at all three wells indicates that EW-1 (3.8 pounds per million gallons of water) is currently extracting the greatest percentage VOC mass. Thus, this would indicate that EW-1 continues to draw contaminant mass in its immediate vicinity, but its capture zone is limited. Another line of evidence suggesting that its effectiveness has diminished with time are the previously observed increasing concentrations evident in MW-9D, MW-12D, and MW-14D although VOC concentrations appear to be relatively constant during this review period.

Central Plume

EW-2 is located between Buildings 1 and 2, in the vicinity of the Former Waste Oil UST Area. EW-2 was designed specifically to provide source-area capture and treatment of groundwater impacted from the Former Waste Oil UST Area. The primary COCs at EW-2 are PCE and TCE with concentration ranges during this review period of non-detect to 6.3 ug/L and 14.1 to 278 ug/L, respectively.

The central plume contains both 1,1,1-TCA and TCE with lesser concentrations of their respective decay products (cis-1,2-DCE, 1,1-DCA, and 1,1-DCE). In addition, PCE and carbon tetrachloride, along with its decay product (chloroform), have been detected within the central plume. Monitoring wells MW-1, MW-2, and MW-3 identify the central plume source area. Concentrations of PCE, TCE, and 1,1-DCE were highest in MW-3 with maximum concentrations during this review period of 56.3 ug/L (2011), 8,130 ug/L (2011) (see Figure 8 for TCE trend in MW-3), and 170 ug/L (2011) respectively, while 1,1,1-TCA concentrations showed higher concentrations in MW-1 with maximum concentrations of 864 ug/L (2013). At MW-1, VOC concentrations have decreased significantly since start-up of the groundwater treatment system, from a historical high of 110,900 ug/L (2004) to 581.9 ug/L.

Similarly, at MW-2, the VOC concentrations have decreased from the historical high of 53,000 ug/L to 7.7 ug/L and at MW-3 with a historical high of over 40,000 ug/L to 13 ug/L. Monitoring well MW-32D provides a sampling point downgradient of the Former Waste Oil UST Area. The VOC concentration at MW-32 has generally decreased over time, from a historic high of 2,396 ug/L (2001) to 9.9 ug/L.

Western Plume

EW-3 is located north of Building 1, downgradient of the potential source area beneath Building 1. EW-3 was designed specifically to provide source-area capture and treatment of groundwater impacted from historical Building 1 operations. TCE and 1,1-DCE are the primary COCs at EW-3 with concentration ranges during this review period of 31 to 96.6 ug/L (Table 4 and Figure 9) and 8.8 to 18 ug/L, respectively.

The western plume is defined by samples collected from MW-20D, MW-11S, and MW-29D and is historically associated with the areas located to the west of Building 1. Total VOC

concentrations for these wells in 2014 were 13 ug/L, non-detect, and 67.1 ug/L, respectively, with overall lower concentrations since 2009. Extraction well EW-3 pumps groundwater associated with the western plume. Prior to system start-up the TCE concentrations in EW-2 were as high as 4,200 ug/L (July 1998), but more recently have been between 10 and 20 ug/L.

Off-Site Monitoring Wells

Two monitoring wells (MW-5DB and MW-6D) were sampled in December 2009 to provide data characterizing the VOC plumes as they migrate towards the Rockaway Township Wellfield. MW-5DB is a deep regional aquifer well that is located west of the Rockaway Township Wellfield. This area has been impacted by petroleum-related compounds from the Shell Service Station at 8 Greenpond Road. The primary COC in both MW-5DB and MW-6D has been TCE and concentrations over this review period show decreasing concentrations from 2.1 – 0.43 J ug/L and 27.1 – 0.5 J ug/L, respectively.

In summary, three distinct groundwater plumes originate from three different source areas. The primary COCs in the eastern plume are PCE and TCE. The primary COCs of the central plume are 1,1,1-TCA and TCE. The primary COCs of the western plume are TCE and 1,1-DCE. Extraction wells EW-1, EW-2, and EW-3 are dedicated to reducing contaminant mass in each respective plume. Data from this review period indicate that the majority of the mass is present in the eastern and central plumes while EW-1 has shown the highest contaminant concentrations, specifically TCE, observed in the extraction wells. MW-3 meanwhile has shown the highest contaminant concentration during this review period, with TCE at 8,080 ug/L in 2011. The groundwater contaminant plumes appear to be contained by EW-2 and EW-3. There is some question regarding EW-1, as its effectiveness appears to have become reduced with time and although there is monitoring along the lateral limits of the plume (i.e. MW-9D, MW-12), there is currently no downgradient monitoring of the plume. Therefore, the downgradient extent of the eastern plume is currently not delineated.

Soil-Vapor Extraction System

During 2014, the SVE system operated approximately 73% of the time. An air sample is collected for VOC analysis from the carbon effluent on a monthly basis, in accordance with the SVE air permit. SVE effluent air analytical results indicate that air emissions are below the permit requirements. VOC analytical data indicated air permit requirements for operation of the vapor-phase carbon treatment system were met during 2014. Individual soil-vapor samples were collected in June and December of 2014 from each SVE and dual-phase well and submitted for analysis specific to a select list of VOCs, including TCE and 1,1,1-TCA. In an effort to increase system vacuum pressure, and increase VOC recovery efficiency from monitoring points exhibiting elevated VOC concentrations, the five monitoring points exhibiting the lowest VOC concentrations (DP-1, DP-2, DP-3, SVE-7, SVE-8) have been closed since 2011. All eight of the remaining SVE monitoring points initially exhibited increased VOC concentrations following the selective closing of the monitoring points. As of the December round of sampling, VOC concentrations exceed the pre-closing values in all of the monitoring points. The maximum total VOC concentrations recorded were 1.9 parts per million by volume (ppmv) at SVE-5 for the June 2014 event, and 5.6 ppmv at SVE-9 for the December 2014 event.

An estimate of the mass of VOCs removed from the soil through the SVE system during 2014 has been made using SVE flow data, and the VOC analytical results from influent samples collected in February, April, July, and November, 2014. The influent sample was collected from the combined SVE line just prior to entering the SVE carbon unit. Based upon these measurements, approximately 56 pounds of VOCs were extracted from the soil during the 2014 operating period. Since the initial SVE system start-up in June 2005, approximately 1,382 pounds of VOCs have been removed.

Sub-Slab Depressurization System

The sub-slab depressurization systems are currently monitored on an annual basis; down from the initial quarterly monitoring events. Inspections at Buildings 1 and 2 for the last few years included measurements of operational pressures for all the blowers along with measurements of flow and pressure for the individual extraction points. Pressure measurements for the two remaining sub-slab probes in Building 2 were also recorded. While pressures at all locations have decreased since the system was commissioned, none of the pressure values have fallen more than 20 percent below the baseline pressure readings. This has been noted in progress reporting events during the FYR period as being protective from vapor intrusion. However, the pressure designed subslab pressure of 0.004 inches of water column is on the low end of what is recommended by NJDEP and well below the ASTM standard for radon mitigation systems typically used by EPA. Based on EPA experience, this pressure may not be sufficient to overcome a powerful HVAC system. As is discussed later, additional indoor air sampling is being recommended by EPA. No actual indoor air sample results have been provided since 2011.

Since the groundwater plumes extend downgradient of Buildings 1 and 2, it is recommended that the PRP conduct additional vapor intrusion studies for buildings overlying the downgradient portions of the plume.

Site Inspection

A formal inspection of the site by the FYR team was not conducted. On September 22, 2014 Ronald Naman, EPA; Donna Gaffigan of the NJDEP, and Mr. Sheard of the local water utility met at the Site (during an area site review by government representatives) and discussed recent project activities as they related to the assessment of remedy protectiveness. No remediation system impediments were brought to light which impact the ongoing operations of remediation systems. Comments submitted to NJDEP by EPA in regard to earlier reports (including the 2011 Remedial Action Progress Report and 2010 270-day Immediate Environmental Concern Report) were discussed. These included the need for some additional monitoring of groundwater and indoor air.

Interviews

No interviews were conducted during this FYR process. Discussions were held with NJDEP regarding comments tendered by EPA related to site evaluation and remediation system performance.

Institutional Controls Verification

A CEA was established by NJDEP on November 17, 2000, to restrict groundwater use within the aquifer at Denville Technology Park and a portion of the aquifer between Denville Technology Park and the Rockaway Township municipal wellfield. The CEA/WRA remains in place.

Exposure to subsurface soils was not evaluated in the risk assessment to support the OU2 remedy. EPA recommends that the State/PRP put a deed notice on the DTP.

Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

TCE contamination of groundwater is found in three distinct plumes. The western plume has no identified source and shows comparatively lower concentrations of COCs compared to the central and eastern plumes. Groundwater extraction well EW-3 was designed to intercept the western plume. The remedy addressing the western plume is functioning as intended. Extraction well EW-3 is creating a significant cone of depression in the water table which acts as a hydraulic boundary to the contamination. Additionally, all the monitoring wells located in the western plume (i.e., MW-11S, MW-29D, MW-32D) have all shown declining TCE concentration trends since 2005.

The central and eastern plumes appears to have multiple sources of contamination. A source of TCE contamination is located in the vicinity of groundwater extraction well EW-2, and is being addressed by the SVE system. Another known source of contamination is located inside Building 2, at the location of a former degreaser pit and is being addressed by the SVE system through vapor well EV-1 and downgradient groundwater extraction well EW-1.

Overall, the SVE system appears to be functioning as designed. The system continues to extract VOC mass and concentrations at nearby monitoring wells (i.e., MW-1, MW-2, MW-3) show levels are significantly below historical values.

Several lines of evidence suggest that the groundwater extraction well for the eastern plume, EW-1, is not functioning as intended. First, extraction rates have been below the intended operational flow rate and may be decreasing with time. Most recently EW-1 was pumping at 3.7 gpm, which has reduced from 5 to 8 gpm, indicating that perhaps the extraction well has become less effective with time. Additionally, little apparent drawdown was evident in nearby monitoring wells, even in MW-14, which is located about ten feet from EW-1. However, while EW-1 has been extracting less than ten percent of the volume extracted by EW-3, a comparison of the mass of VOCs extracted at all three wells indicates that EW-1 (4.7 pounds per million gallons of water) is currently extracting the greatest percentage VOC mass. Thus, this would indicate that EW-1 continues to draw contaminant mass in its immediate vicinity, but its capture zone is limited. There have been previous concerns about increasing concentrations evident in MW-9D, MW-12D, and MW-14D although VOC concentrations appear to be relatively constant during this review period.

Although not envisioned as part of the remedy for the site, in 2010, based on additional vapor intrusion pathway characterization, a partial subslab depressurization system was installed in both Buildings 1 and 2 to mitigate the vapor intrusion pathway. These systems continue to operate and be monitored. This FYR recommends expanding the vapor intrusion investigation to downgradient properties and recommends re-instituting indoor air sampling to evaluate system performance and potential background sources.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

There have been no physical changes to the Site that would adversely affect the protectiveness of the remedy. The exposure assumptions and the toxicity values that were used to estimate the potential risks and hazards to human health followed the general risk assessment practice at the time the risk assessment was performed. Although the risk assessment process has been updated and specific parameters and toxicity values may have changed, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid.

The contaminant cleanup levels for groundwater established in the OU1 ROD are the more stringent of the federal and state drinking water standards. Although groundwater data from the past five years indicate a decreasing trend overall for site-related COCs, with TCE being the primary one, the concentrations of this compound are consistently above the NJGWQS of 1 ppb in several areas. However, the municipal supply well that was impacted by site-related COCs is treated with an air stripper to meet drinking water quality standards. Therefore, the drinking water exposure pathway is not complete.

As noted in the 1999 RI/FS, there was a sand filter bed that received acid chromate metal plating wastewater located south of Building 2. There appears to have been little sampling for chromium during the RI and currently only VOC data are collected. It is suggested that two rounds of groundwater samples from this area, as well as the public supply well, be analyzed for hexavalent chromium to ensure this compound, which is highly soluble and not treated by air stripping, is not present in the groundwater or drinking water.

1,4-dioxane is a highly soluble compound that is also not treated by air stripping. It is often used as a stabilizer for 1,1,1-TCA, which is present in groundwater at the Rockaway Township Site. Sampling for 1,4-dioxane has not occurred. Therefore, it is suggested that two rounds of groundwater samples collected from the Site, as well as the public supply well, be analyzed for 1,4-dioxane to ensure this compound is not present in the groundwater or drinking water.

The Focused Risk Assessment performed as part of the 1999 RI/FS for OU2 determined that exposure to subsurface soil (surface soil data from depths less than two feet below ground surface were not collected) would not result in unacceptable risk or hazard to the commercial worker, construction worker or trespasser. The Site is expected to remain commercial/industrial in the future and is almost entirely covered by building foundations or pavement. However, EPA suggests that an institutional control be placed on the property to ensure only commercial use in

the future. Also, if the buildings were to be demolished and the current paving removed, surface soil sampling might be necessary to determine whether direct contact would pose a risk.

The Focused Risk Assessment in the 1999 RI/FS also concluded, using modeling, that there was no risk from inhalation of vapors to tenants of Building 2. However, a 2009 vapor intrusion investigation revealed that residual VOC contamination in the groundwater and soil was impacting Buildings 1 and 2. Region 2's multiple-lines-of-evidence approach for evaluating vapor intrusion was used in conjunction with the State of New Jersey's Vapor Intrusion Guidance to evaluate subslab and indoor air data collected from the Denville Technical Park.

In the 2010 FYR, EPA also recommended that the vapor intrusion investigation be expanded to Buildings 3, 5, and 6 since they may be impacted by groundwater contamination. This investigation has not occurred. Additionally, EPA asked for either the subslab of the former Glitterwrap facility be sampled or an investigation of the shallow groundwater be conducted to determine whether or not the vapor intrusion pathway is potentially complete there. This investigation has not occurred. This FYR also recommends the collection of samples at these properties.

In addition, in September 2011, EPA's Integrated Risk Information System (IRIS) released a Final Toxicity Assessment for TCE and in February 2012, a Final Toxicity Assessment for PCE. In the assessments TCE and PCE are characterized as "likely to be carcinogenic to humans" by all routes of exposure. Based on these reassessments, toxicity values were modified and subsequently so were sub-slab and indoor air screening levels for Buildings 1 and 2. The indoor air levels of TCE recorded in 2011 exceed the indoor air screening levels for the revised toxicity value. The new toxicity value was based on a 2011 IRIS assessment which concluded that TCE exposure poses potential human health hazards for noncancer toxicity to multiple organs and systems and to the developing fetus, including fetal cardiac malformations. This and other findings in the IRIS assessment of TCE indicates that women in the first trimester of pregnancy are one of the most sensitive populations to TCE inhalation exposure. For fetal cardiac malformations, a specific developmental effect, the critical period for exposure is considered to be an approximate three-week period in the first trimester of pregnancy during which the heart develops. Therefore, it is recommended that additional indoor air sampling be conducted to determine if the subslab system is sufficient. If it is not sufficient, this issue must be addressed quickly.

Although the ecological risk assessment screening values used to support the 1993 ROD may not necessarily reflect the current values, the site is covered with buildings and pavement and may not provide suitable habitat for ecological receptors. Samples collected from the Beaver Brook and associated marsh during the Remedial Investigation indicated that the sediment and surface water contaminant levels were not significant. Additionally, the groundwater plume flow is toward the extraction wells rather than the Brook. Therefore, the exposure assumptions for ecological receptors are still valid.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No.

Technical Assessment Summary

Based on the data reviewed and the Site inspection, most elements of the remedy are functioning as intended. However, there are issues which need to be addressed: the performance of groundwater extraction well EW-1 should be evaluated and efforts should be made to improve its performance; groundwater samples from the Site and the public supply well should be analyzed for hexavalent chromium and 1,4-dioxane; upgrades or enhancements to the SVE system should be considered to expedite the remedy; indoor air sampling should be performed in Buildings 1 and 2; a vapor intrusion investigation should be performed for Buildings 3, 5, and 6 and 701 Ford Road; and institutional controls, in the form of deed notices, should be implemented at the DTP property to ensure future land use is commercial and that subsurface soils are not disturbed without notification.

Issues, Recommendations and Follow-Up Actions

OU(s): <i>Operable Unit 1</i> <i>- Groundwater</i>	Issue Category: Monitoring			
	Issue: No prior testing for hexavalent chromium or 1,4-dioxane			
	Recommendation: Groundwater samples should be collected for hexavalent chromium and 1,4-dioxane from both the Site and the municipal supply wells to ensure they are not present in groundwater or drinking water.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
Yes	Yes	PRP	State	3/31/2016
OU(s): <i>Operable Unit 1</i> <i>- Groundwater</i>	Issue Category: Monitoring			
	Issue: Downgradient plume monitoring			
	Recommendation: A well cluster should be installed with one well within ten feet below the water table and a second at about a 50-foot depth in a location between Extraction Well No. 1 and 701 Ford Road (the parcel across/north of Ford Road opposite of Building 2). This well cluster is important for monitoring performance of the groundwater extraction system and delineating downgradient water quality levels along the pathway to the municipal well field.			

Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	3/31/2016
OU(s): <i>Operable Unit 1 - Groundwater</i>	Issue Category: Operations and Maintenance			
	Issue: Performance of Extraction Well No. 1			
	Recommendation: Extraction Well No. 1 should be rehabilitated so that it can perform at its operation flow rate of five gallons per minute.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	3/31/2016
OU(s): <i>Operable Unit 1 Groundwater</i>	Issue Category: Operations and Maintenance			
	Issue: Indoor Air Monitoring/Downgradient area indoor air monitoring			
	Recommendation: Sub-slab depressurization system operations and performance for Buildings 1 and 2 have been documented through the presentation of vacuum pressure readings. Indoor air samples should be collected and analyzed for Buildings 1 and 2 to confirm system performance. Additional efforts to identify indoor sources should also occur. Indoor air data at structures overlying the downgradient plume area have not been collected/analyzed. Indoor air samples should be collected at 701 Ford Road and Buildings 3, 5 and 6 area buildings.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
Yes	Yes	PRP	State	3/31/2016
OU(s): <i>Operable Unit 2 Groundwater</i>	Issue Category: Institutional Controls			
	Issue: Surface soil exposure was not evaluated in the risk assessment.			
	Recommendation: A deed notice is needed to ensure long-term protectiveness.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	State	3/31/2016

Protectiveness Statement

Protectiveness Statement(s)		
<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Protectiveness Deferred	<i>Addendum Due Date (if applicable):</i> 3/31/2017
<i>Protectiveness Statement:</i> A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway, groundwater is sampled for hexavalent chromium and 1,4-dioxane, the downgradient plume is delineated, and the effectiveness of EW-1 is evaluated.		
<i>Operable Unit:</i> OU2	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter a date.
<i>Protectiveness Statement:</i> The OU2 remedy protects human health and the environment in the short term because the SVE continues to remove contaminant mass from the source area and the Site is covered with buildings and pavement. In order for the remedy to be protective in the long-term, a deed notice needs to be established for soils.		

Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Protectiveness Deferred	<i>Addendum Due Date (if applicable):</i> 3/31/2017
<i>Protectiveness Statement:</i> A protectiveness determination of the groundwater remedy cannot be made until additional information is obtained regarding the vapor intrusion exposure pathway, groundwater is sampled for hexavalent chromium and 1,4-dioxane, the downgradient plume is delineated, and the effectiveness of EW-1 is evaluated.	

Next Review

The next five-year review report for the Rockaway Township Wells Superfund site will be completed five years from the completion date of this review.

Tables

Table 1: Chronology of Site Events	
Event	Date(s)
Initial discovery of problem or contamination Water samples collected from the Rockaway Township Wells by the Rockaway Health Department and NJDEP indicated the presence of TCE and other VOCs.	1979-1980
Pre-NPL responses Township installed an activated carbon adsorption treatment system in response to contamination	1980
Final NPL listing	1983
NJDEP issued Directives to Morton Thiokol Incorporated (then owner of the Denville Technical Park property), Shell Oil Company, and the Town and Country Gas Station requiring payment to NJDEP to conduct a remedial investigation/feasibility study, and payment to Rockaway Township for the operation and maintenance of an air stripping unit.	9/1983
NJDEP enters into Administrative Consent Order with Morton Thiokol Inc. and Shell Oil Company for payments.	1986
Initial Groundwater RI/FS study completed.	1987
Phase II RI finalized.	9/1989
Feasibility Study finalized.	9/1992
ROD signature • OU1	10/1993
Air Stripper replaced by Potentially Responsible Parties.	10/1993

Source Area Remedial Investigation/Feasibility Study completed.	5/1995
Institutional Control (CEA/WRA) implemented by NJDEP	11/2000
ROD Signature • OU2	10/2002
Remedial design completed.	9/2004
RA Construction completion.	6/2005
Construction completion.	9/2005
Preliminary Close-Out Report.	9/2005
Remedial Action Report completed.	9/2005
Quarterly sampling begins.	9/2005
Semi-annual sampling begins.	1/2008
Vapor intrusion investigations begin.	8/2008
Sub-Slab Depressurization System installed in Buildings 1/2	7/2010
First five-year review completed.	9/2010
270-Day IEC Source Control Report submitted to NJDEP.	1/2011
Groundwater annual sampling begins	2012
2011 Remedial Action Progress Report Submitted to NJDEP	2012
2012 Remedial Action Progress Report Submitted to NJDEP	1/2013
2013 Remedial Action Progress Report Submitted to NJDEP	1/2014
2014 Remedial Action Progress Report Submitted to NJDEP	1/2015

**Table 2a: Remediation Goals for Soil (all concentrations in µg/kg)
From the OU2 ROD**

Contaminants of Concern	Soil - Protection of Groundwater	Human Health Risk	Remediation Goals
cis-1,2-Dichloroethene	500	-	500
Tetrachloroethene	1,000	100,000	1,000
Trichloroethene	500	-	500
Vinyl chloride	500	-	500

**Table 2b: Remediation Goals for Groundwater (all concentrations in µg/L)
From the OU1 ROD**

Contaminants of Concern	National Primary Drinking Water Standards (Federal MCLs)	Remediation Goals
cis-1,2-Dichloroethene	70	70
Tetrachloroethene	5	5
Trichloroethene	5	5
Vinyl chloride	2	2

Table 3: Documents, Data and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	Submittal Date
Phase II Remedial Investigation Report – ICF Kaiser Engineers, Inc.	9/1991
Record of Decision OU1 Groundwater – EPA	10/1993
Record of Decision OU2 Soils – EPA	10/2002
Five-Year Review Report Rockaway Township Wells Superfund Site	9/2010
270-Day IEC Source Control Report	1/2011
2011 Remedial Action Progress Report	1/2012
2012 Remedial Action Progress Report	1/2013
2013 Remedial Action Progress Report	1/2014
2014 Remedial Action Progress Report	1/2015

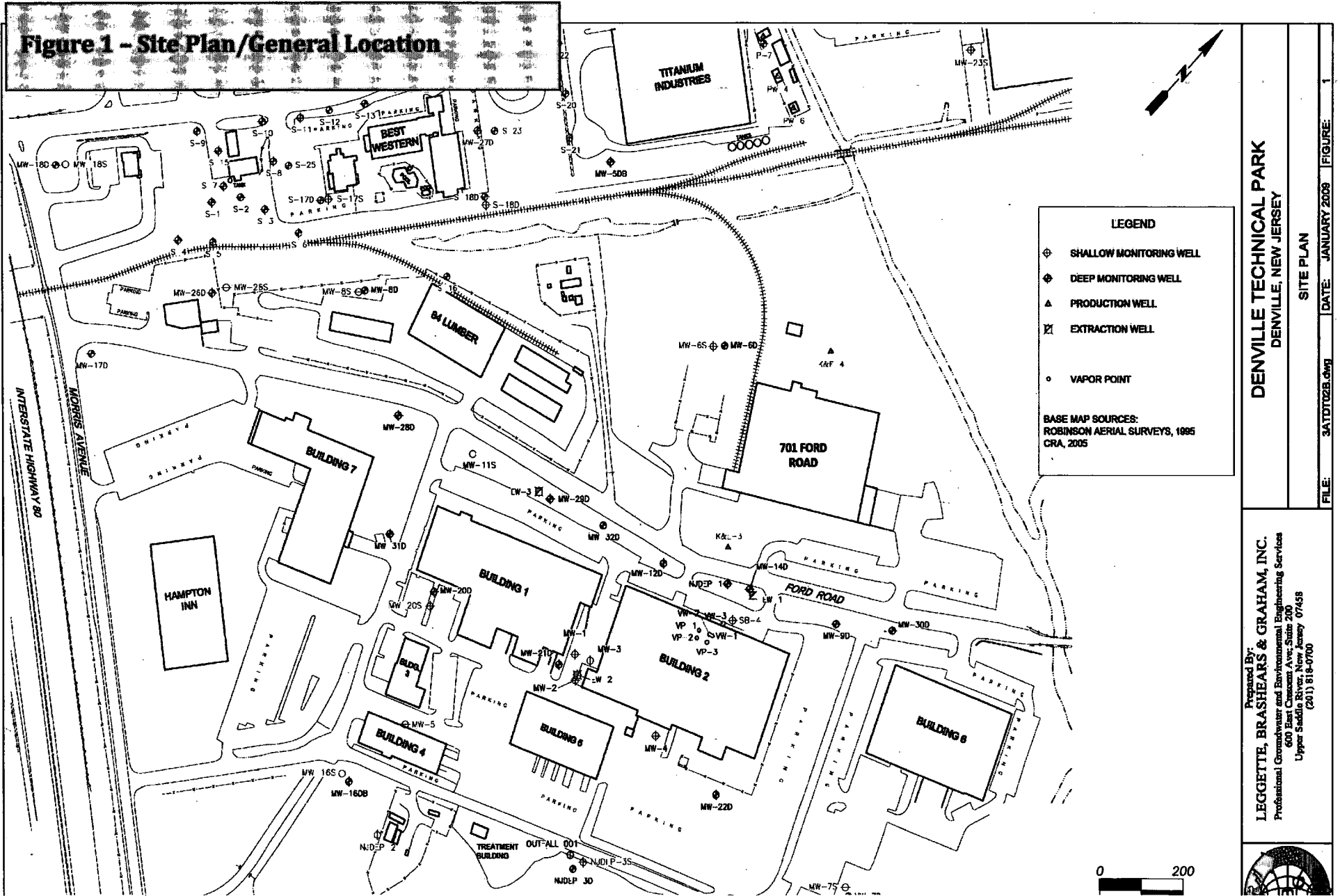
**Table 4 - Rockaway Township Wells - Denville Technical Park
Groundwater Analytical Trends – Key Detected Volatile Organic Compounds (VOCs)
Concentrations Exceeding New Jersey Groundwater Quality Standards**

Well Name/ Number	Compound (ug/L)																			
	Tetrachloroethene (PCE)					Trichloroethene (TCE)					1,1,1-Trichloroethane					1,1-Dichloroethene (1,1-DCE)				
	2009	2011	2012	2013	2014	2009	2011	2012	2013	2014	2009	2011	2012	2013	2014	2009	2011	2012	2013	2014
EW-1	6.1	3.6	3.9	3.1	2.7	272.0	389.0	763.0	184.0	220										
EW-2	6.3			1.0		278.0	16.8	19.8	19.0	14.1										
EW-3						67.9	94.7	71.7	70.0	72.0						3.8	2.9	1.7	1.5	1.1
MW-01		1.9	3.5		4.3	3.5	1.4	4.9	72.2	2.0	93.7	286.0	757.0	864.0	543.0	3.00	13.9	17.9	8.4	14.8
MW-02	3.9	7.9	3.6			434.0	354.0	542.0		5.5							0.96	1.1		
MW-03	16.9	46.9	3.8	1.2		2240.0	8080.0	315.0	95.9	8.0	89.0	207.0				44.00	170	3.5		
MW-03 R		56.3					8130.0					236.0					187			
MW-04							1.5													
MW-05DB						2.1	2.4	1.7												
MW-06D						27.1	3.9	39.2	1.8									4.4		
MW-09D	5.3		4.2			3.5	2.3	2.1	2.3	1.7										
MW-11S																				
MW-12D	2.4	2.0		1.2	1.7	29.0	30.8	2.8	24.0	36.5										
MW-12D R	2.5	1.9				29.7	29.6	3.6												
MW-14D	6.9	1.1	3.4		1.1	10.8	1.8	8.6		1.6										
MW-20D			1.0			17.4	14.2	18.0	15.6	11.3										
MW-21D						1.5		4.8		2.5										
MW-28D																				
MW-29D	1.1					96.6	42.7	51.2	46.5	31.0	56.8	46.0				13.8	18.0	15.7	25.1	8.8
MW-30D																				
MW-32D						8.3	10.0	6.5	5.8	5.6						1.9	2.8	2.0		

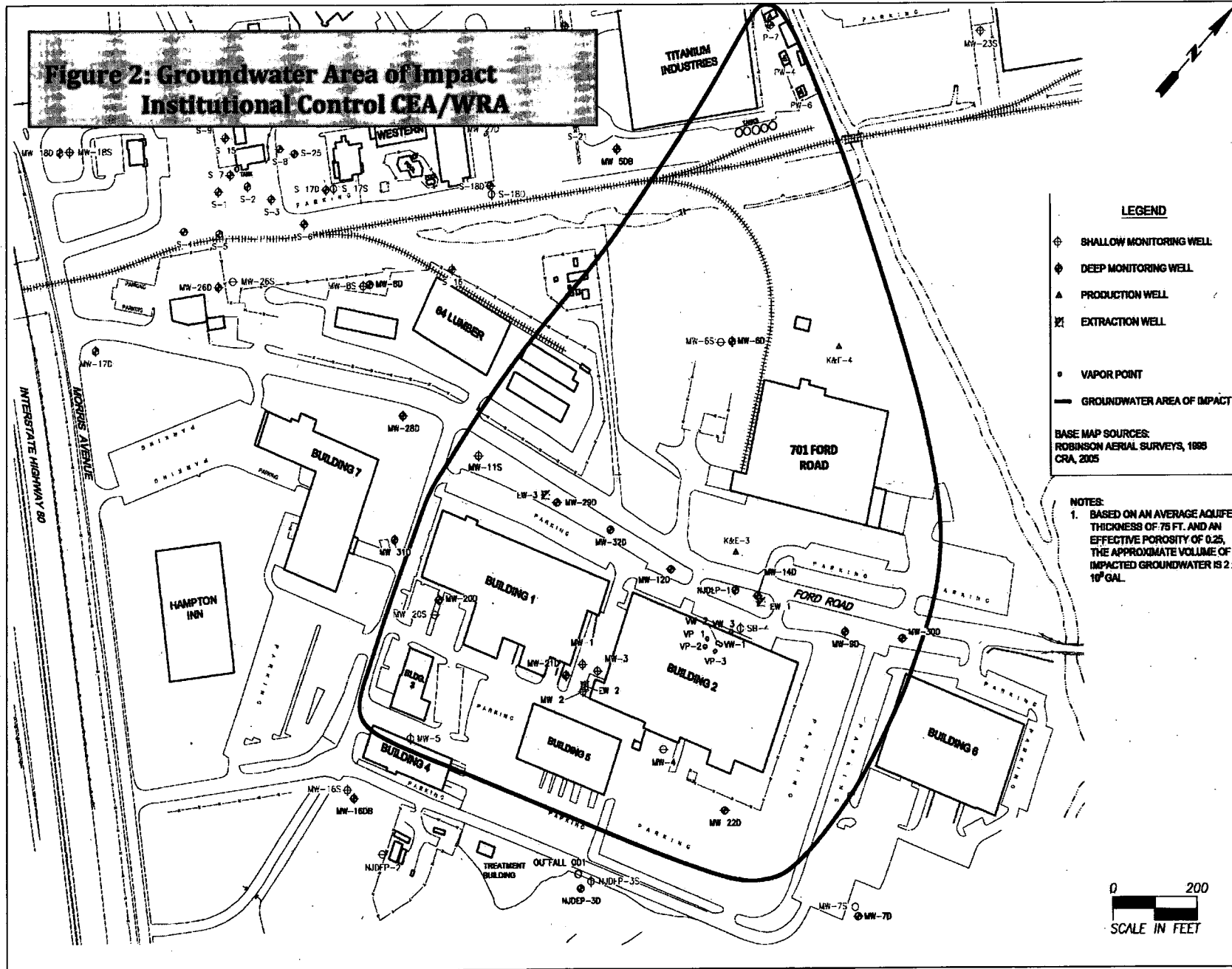
New Jersey Groundwater Quality Standards/Notes: Tetrachloroethene (PCE) – 1 ug/L, Trichloroethene (TCE) – 1 ug/L, 1,1,1-Trichloroethane – 30 ug/L, 1,1-Dichloroethene (1,1-DCE) – 1 ug/L, Blank space denotes level not exceeding NJ GWQS or non-detect

Figures

Figure 1 - Site Plan/General Location



**Figure 2: Groundwater Area of Impact
Institutional Control CEA/WRA**

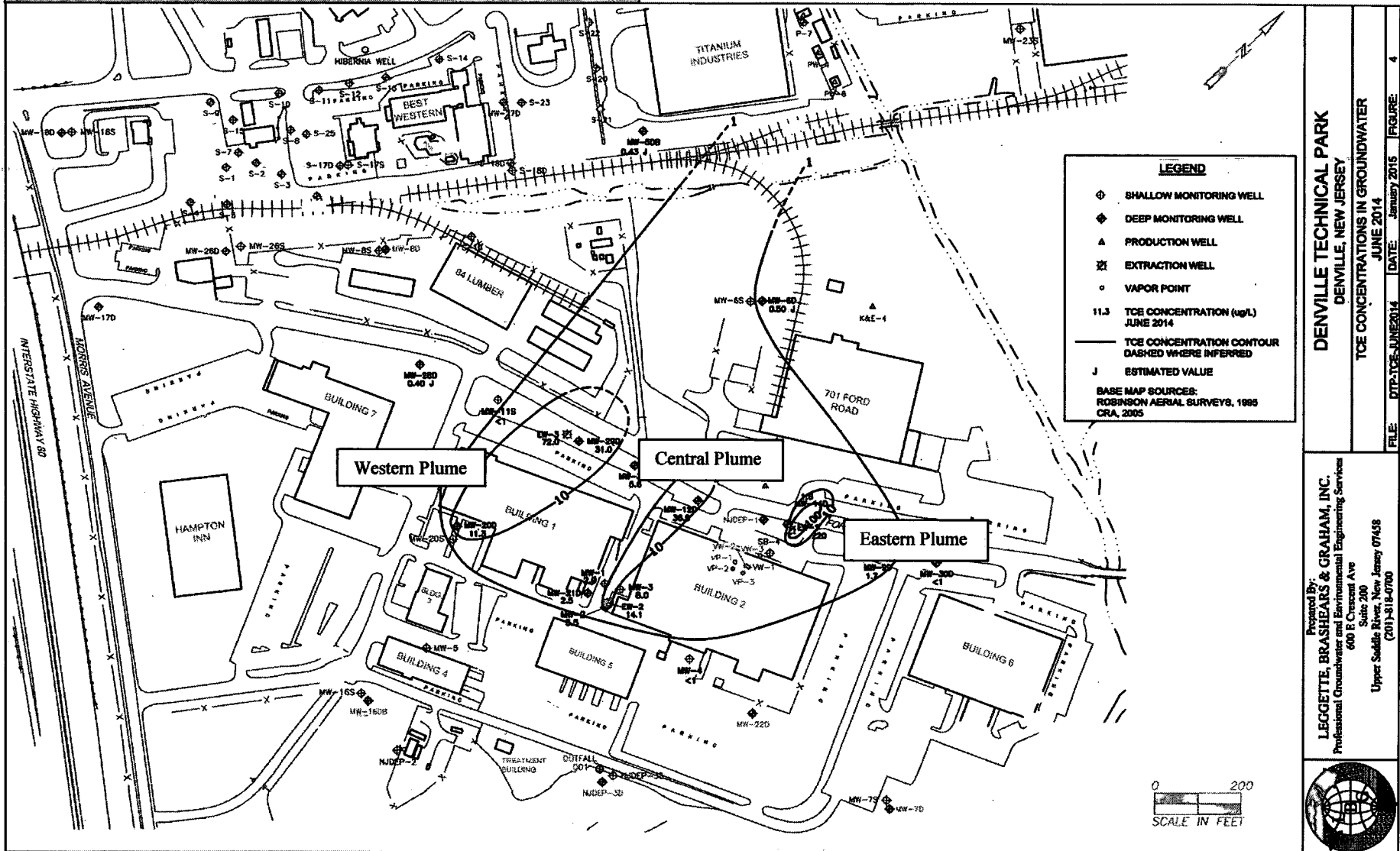


DENVILLE TECHNICAL PARK
DENVER, NEW JERSEY
GROUND-WATER REMEDY

Prepared By:
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Figure 3: TCE Concentrations in Groundwater



DENVILLE TECHNICAL PARK
DENVILLE, NEW JERSEY

TCE CONCENTRATIONS IN GROUNDWATER
JUNE 2014

FILE: DTP-TCE-JUNE2014 [DATE: January 2015] [FIGURE: 4]

Prepared By:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Groundwater and Environmental Engineering Services
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(201) 318-0700



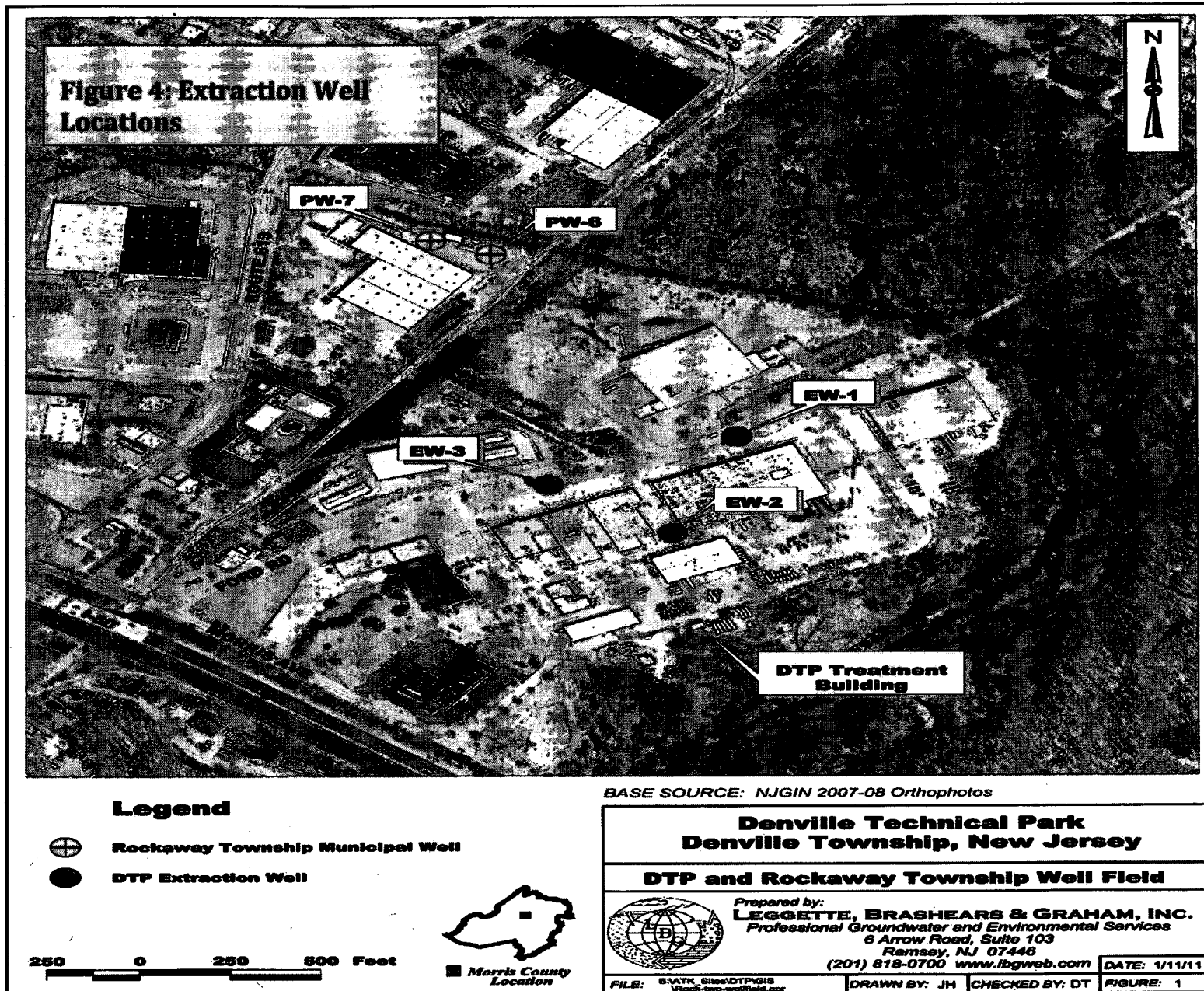


Figure 5: DP and SVE Well Locations

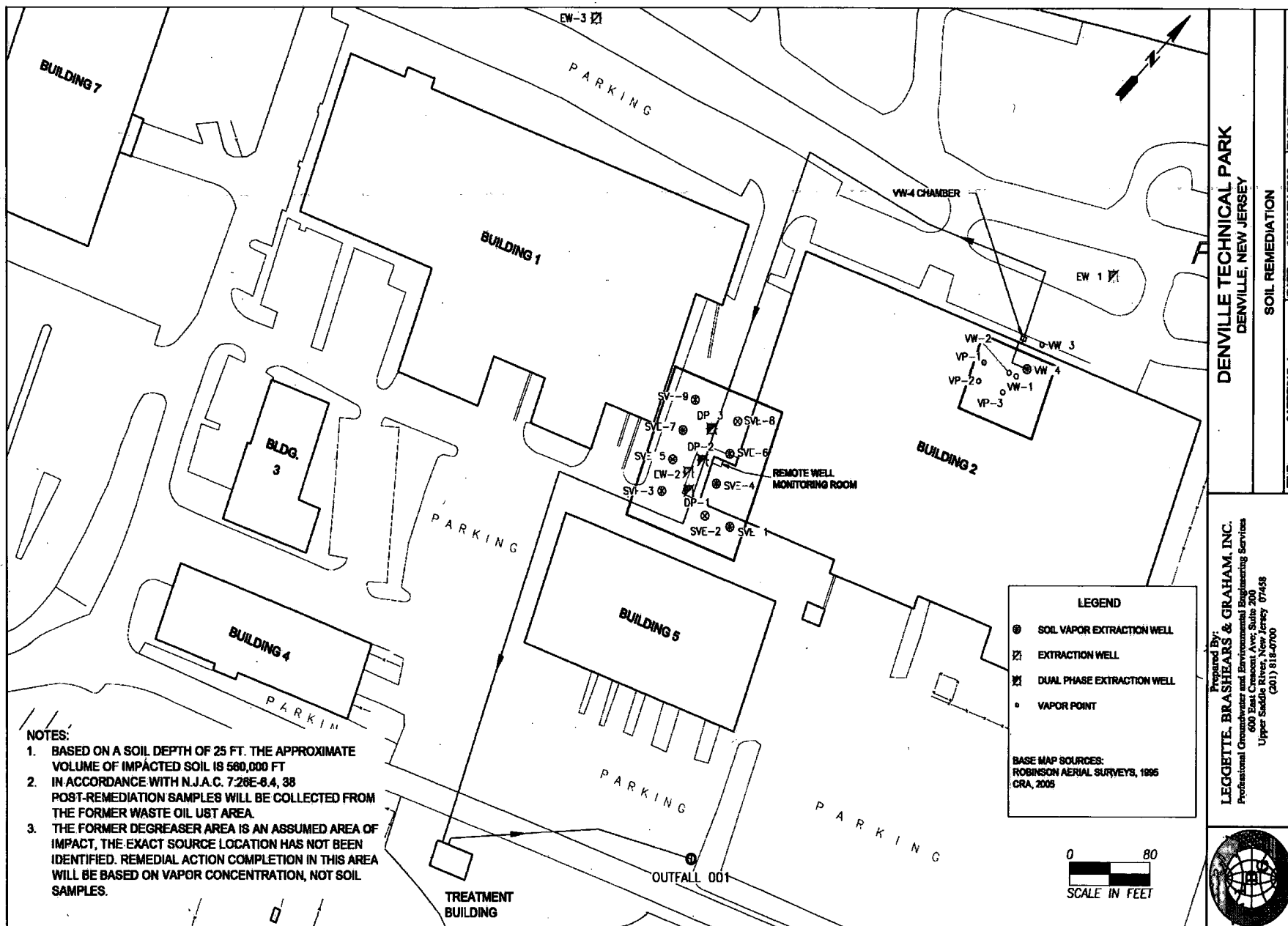


Figure 6: Sub Slab Depressurization System Interior Layout

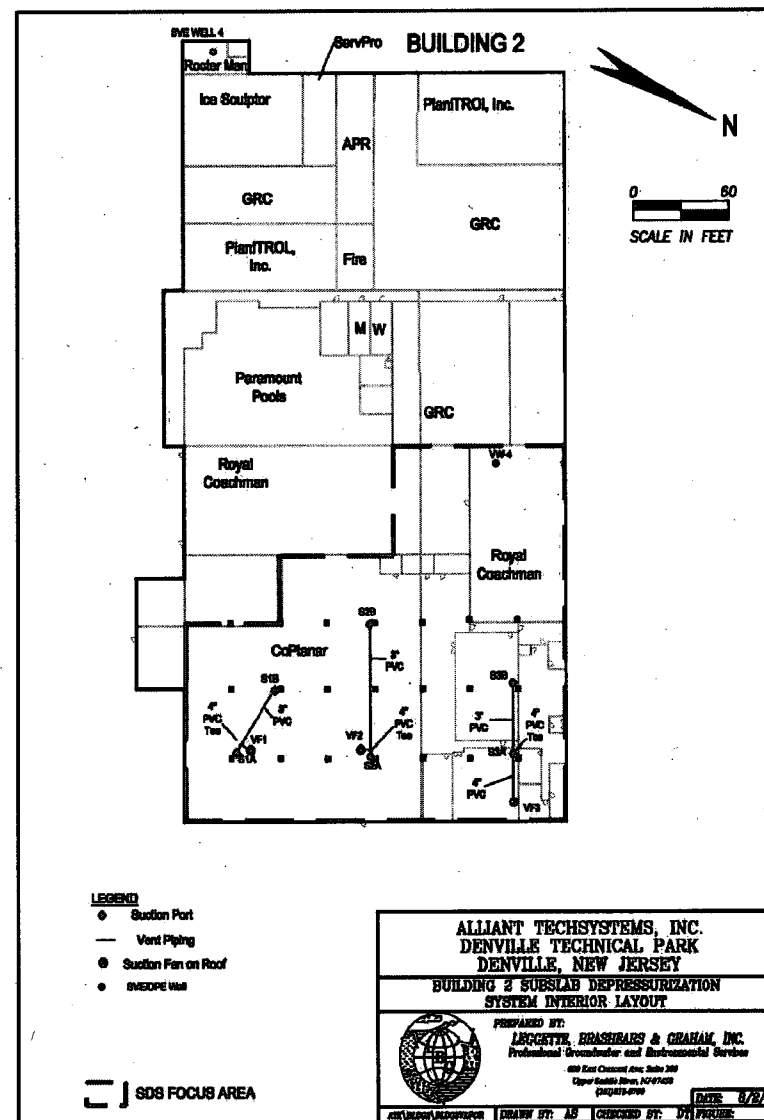
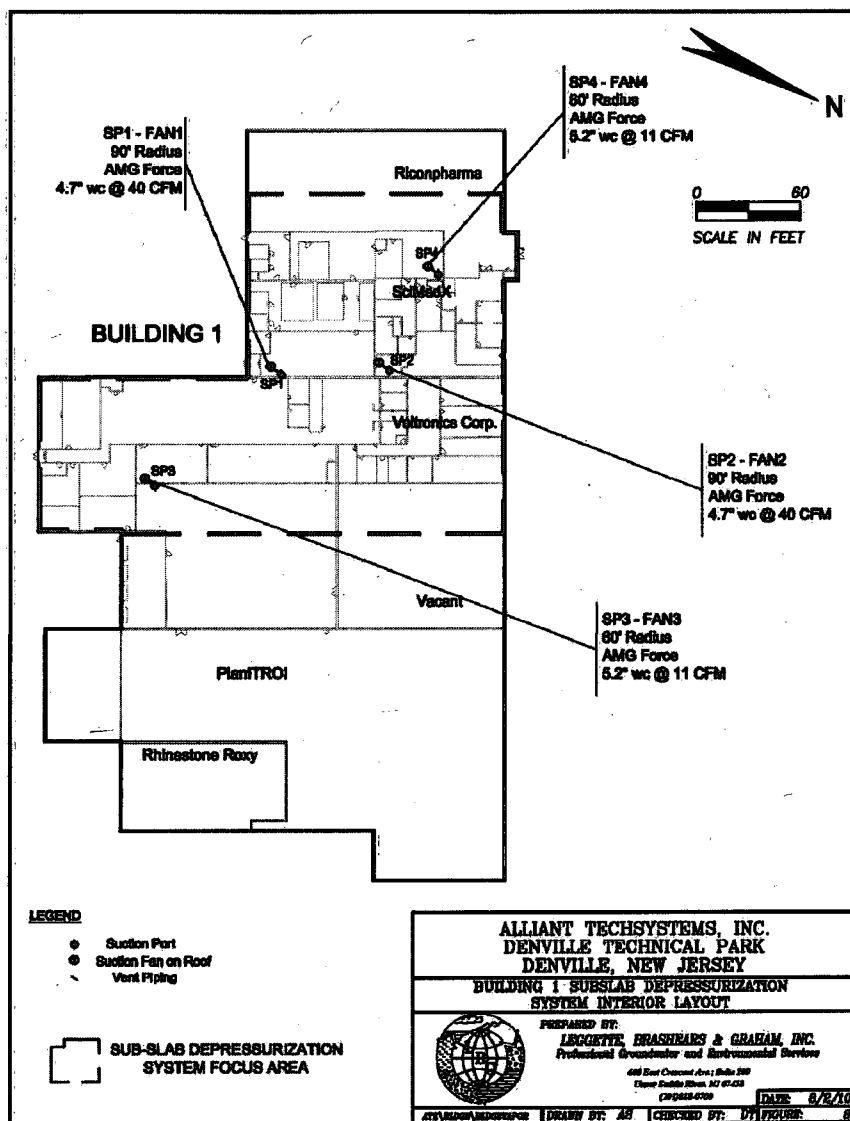


Figure 7: TCE concentrations over the five-year review period in recovery wells

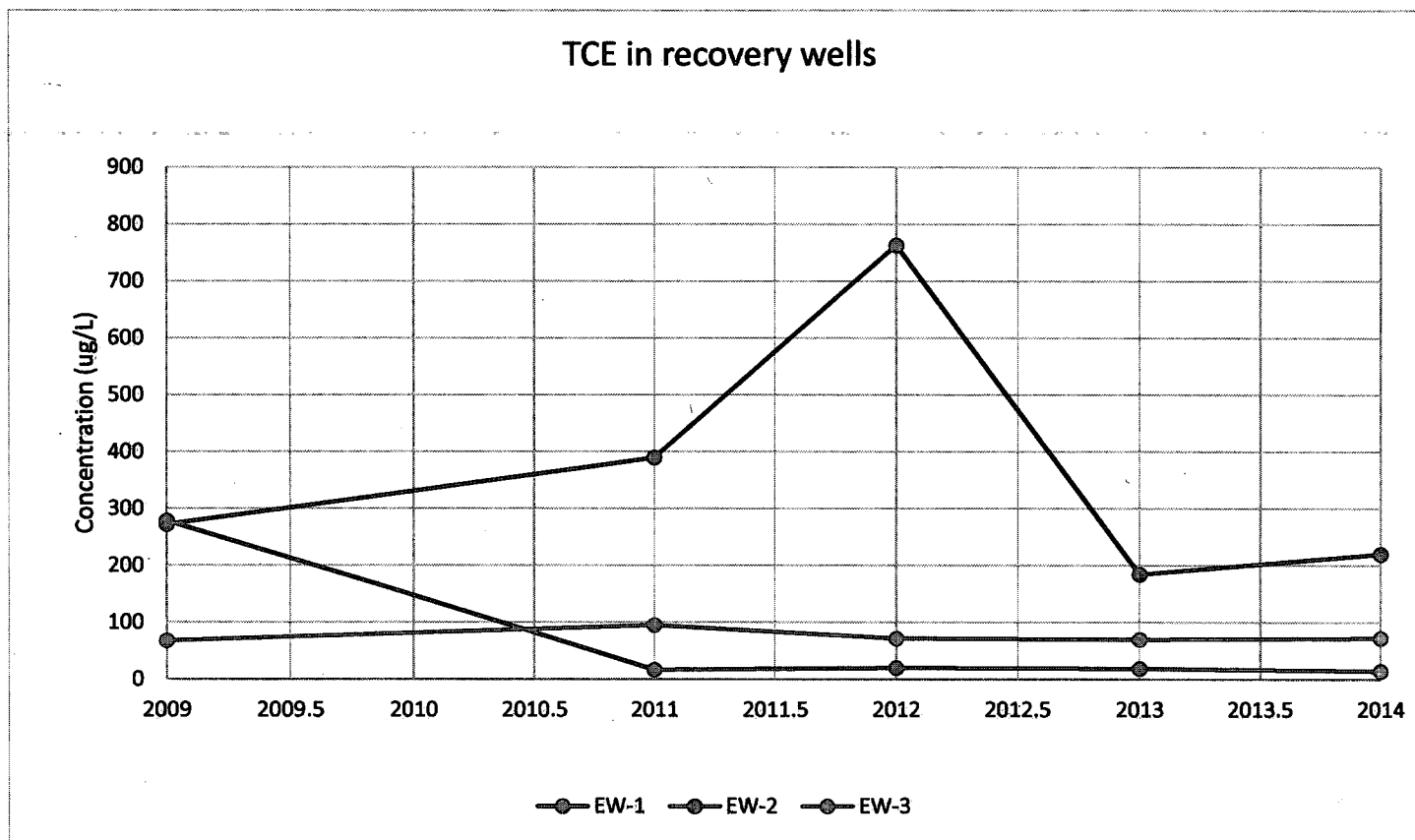


Figure 8: TCE concentrations in MW-3

The well showing the maximum TCE concentration (8,080 ug/L) during this five-year review period.

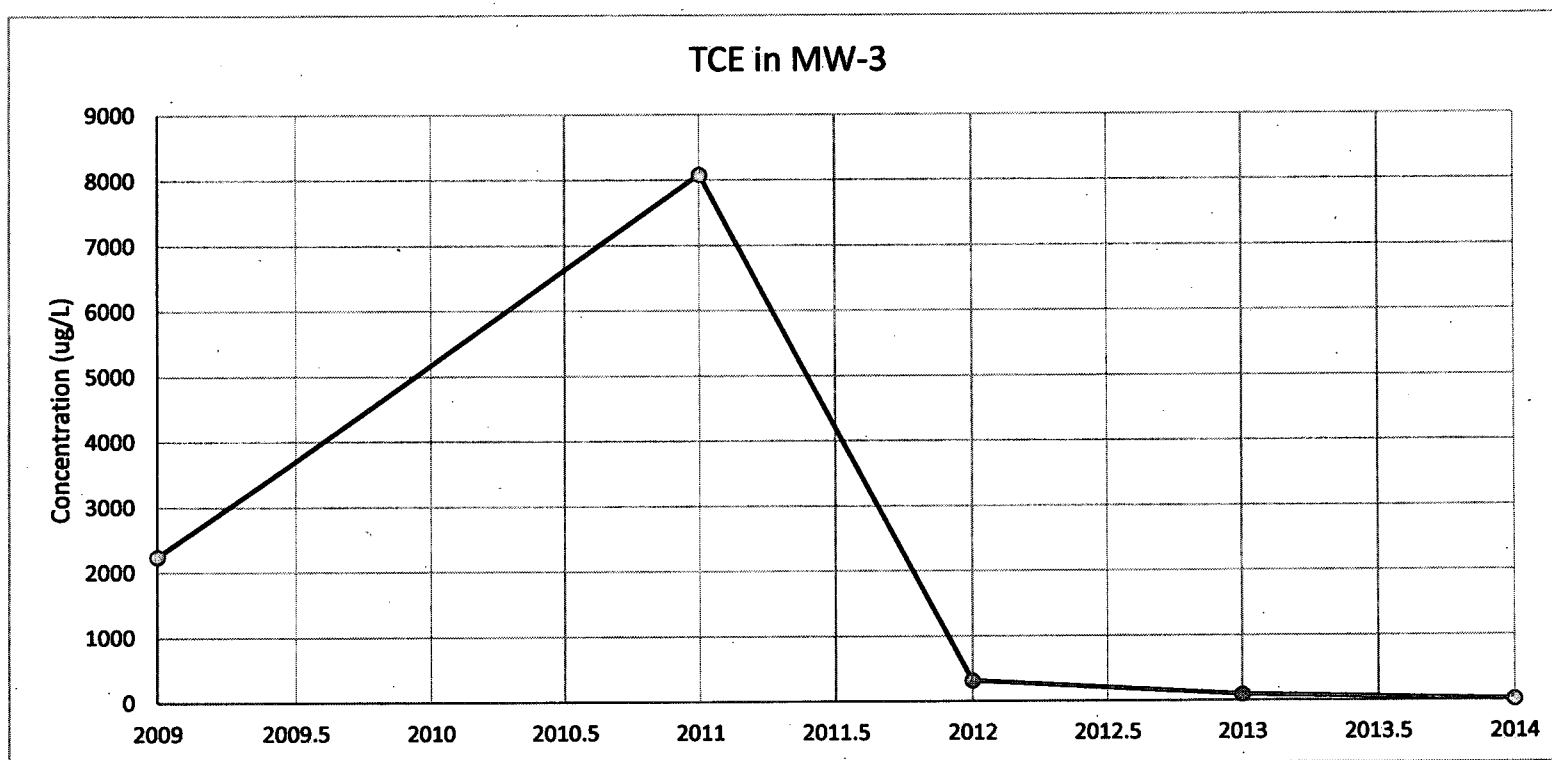


Figure 9: TCE concentrations in MW-29D

Show overall decreasing concentrations during this five-year review period.

